REMARKS

Upon receipt of this response, the Examiner is respectfully requested to contact the undersigned representative of the Applicant to arrange a telephone interview concerning the inventive merits of this application.

Initially, the Applicant thanks the Examiner for noting that claims 122 and 123 are objected to as being dependent upon a rejected base claim but would be allowable if rewritten in independent form to include all of the limitations of the base claim and any intervening claim(s). In response, claim 122 is appropriately revised to be an independent claim, and this amended claim is now believed to be allowable as previously indicated by the Examiner. As claim 123 depends directly from independent claim 122, dependent claim 123 is also believed to be allowable as well so that, at the very least, claims 122 and 123 are all now in a condition for allowance.

Claim 131 is rejected under 35 U.S.C. § 112 as being an in the improper form of an "omnibus claim." In view of this, claim 131 is cancelled, without waiving any rights to the subject matter recited therein, in favor of new independent claim 132.

Next, claims 102-104, 121, 124, 126 and 130 are rejected, under 35 U.S.C. § 102, as being anticipated by Nakata `768 (United States Patent No. 5,785, 768). Claim 125 is rejected, under 35 U.S.C. § 103, as being unpatentable over Nakata `768 in view of Sugawara et al. `041 (United States Patent No. 6,563,041). Claims 102,103, 106 and 107 are rejected, under 35 U.S.C. § 103, as being unpatentable over Mlavsky `944 (United States Patent No. 4,078,944) in view of Middleton et al. `050 (United States Patent No. 3,411,050). Claims 102, 103, 126 and 130 are rejected, under 35 U.S.C. § 103, as being unpatentable over Bender `040 (United States Patent No. 3,844,040) in view of Escoffery `862 (United States Patent No. 3,005,862). Claims 102, 103, 105, 106, 110 and 130 are rejected, under 35 U.S.C. § 103, as being unpatentable over Simburger `621 (United States Patent No. 6,127,621) in view of Ellion `588 (United States Patent No. 4,710,588). Claim 106 is rejected, under 35 U.S.C. § 103, as being unpatentable over Simburger `621 in view of Ellion `588, and in further view of Simburger `966 (United States Patent No. 6,284,966). Claims 107-109 are rejected, under 35 U.S.C. § 103, as being unpatentable over Simburger `621 in view of Simburger `966 and further in view of

Knoblach et al. `361 (United States Publication No. 2002/0072361 A1). Claim 111 is rejected, under 35 U.S.C. § 103, as being unpatentable over Simburger `621 in view of Ellion `588 and Knoblach et al. `361, and in further view of Nazri `743 (United States Patent No. 4,826,743). Claims 117-118 and 120 are rejected, under 35 U.S.C. § 103, as being unpatentable over Simburger `621 in view of Ellion `588 and Knoblach et al. `361, and in further view of Skov `223 (United States Patent No. 3,258,223). Claims 118- 119 are rejected, under 35 U.S.C. § 103, as being unpatentable over Simburger `621 in view of Ellion `588, Knoblach et al. `361, and Skov `223, and in further view of Etkin `183 (United States Patent No. 3,268,183). Claims 127-129 are rejected, under 35 U.S.C. § 103, as being unpatentable over Simburger `621 in view of Ellion `588, and in further view of Ikeda et al. `481 (WO 03/005,481). The Applicant acknowledges and respectfully traverses all of the above raised anticipatory and obviousness rejections in view of the above amendments and the following remarks.

Before discussing the applied prior art in detail, the Applicant would first like to summarize the inventive aspects of the presently claimed invention. As presently claimed, the present invention relates to and covers a photovoltaic device comprising an envelope and a photovoltaic element comprising a plurality of layers of film. At least a portion of the envelope has a curved profile with a radius of less than 50 mm (see new claim 132). The layers of film are formed on the inside surface of the envelope to define an at least partially encapsulated void inside the photovoltaic element.

Turning now to the raised rejection of claims 102-104, 121, 124, 126 and 130 in view of Nakata `768, this reference relates to and describes a photo cell and array which includes a solid crystal semiconductor with multiple bulbous projections. The outer portion of the bulbous projection is chemically altered to create a light receiving layer. The Examiner indicates that claim 102 is not novel in view of Nakata ` 768, specifically referring to Figure 1(b).

In the previous Official Action response, the Applicant amended claim 1 to define that the photovotaic element comprises layers of film and is formed on the inside surface of the envelope. By forming the photovoltaic device from layers of film on the inside surface of the envelope, it is possible to utilize the space inside the envelope for additional purposes such as

mounting electronic equipment or providing a reservoir of electrolyte to top up the photovoltaic device.

The devices described in Nakata `768, including that shown in Figure 1(b), are formed by altering the surface of the bulbous projections of the "plate like base material (2) [which] is made from single crystal p-type silicone semiconductor." See column 5, lines 30-31. Thus, there is no void or space encapsulated by the photovoltaic element layers which could be used for other purposes, as with the present invention.

Additionally, the photovoltaic device of the presently claimed invention is designed with particular size constraints in mind, as noted in the specification, whereby the radius of the curved profile is less than 30-50 mm and preferably less than 5-10 mm. This size allows for the photovoltaic device to be utilized on motes and miniature motes in a variety of circumstances, including deliverable motes. It is respectfully submitted that Nakata `768 does not teach the radius of the n-type portion of the bulbous projections, or that the radius of curvature should be less than 30-50 mm.

In order to further emphasize the above noted distinctions between the presently claimed invention and the applied art, independent claim 102 now recites the features of "[a] photovoltaic device...wherein the plurality of layers of film are formed on the inside surface of the envelope and define a space within the photovoltaic element." (Emphasis added), while new independent claim 132 recites the same limitations but further recites the feature of "the envelope having a curved profile with a radius of less than 50 mm." It is respectfully submitted that such features are believed to further distinguish the presently claimed invention from all of the art of record, including the applied art of Nakata `768. As such, the raised rejection of claims 102-104, 121, 124, 126 and 130 and new claim 132, in view of Nakata `768, should be withdrawn at this time in view of the forgoing.

The Examiner then states that claim 125 is unpatentable over Nakata `768 in view of Sugawara `041. First, the above remarks concerning the distinctions between Nakata `768 and the presently claimed invention are incorporated herein in response to this rejection. Second, it is respectfully submitted that Sugawara `041 relates to and describes a photoelectric device comprising numerous p-type crystalline semiconductor particles embedded in a

conductive base and coated with an n-type semiconductor layer. Similar to Nakata `768, the curved portion of the light receiving layer in Sugawara `041 is formed directly on the exterior surface of the semiconductor partials, such that no space or void is encapsulated by the photovoltaic element layers which could be used for other purposes, as with the presently claimed invention.

In view of the above, it is respectfully submitted that Sugawara `041 fails to overcome the above discussed deficiencies of Nakata `768. Accordingly, it is respectfully submitted that the raised rejection, in view of the applied combination of Nakata `768 and Sugawara `041, should be withdrawn at this time and claim 125 allowed.

Next, the Examiner states that claims 102, 103, 106 and 107 are unpatentable over Mlavsky `944 in view of Middleton et al. `050. First, Mlavsky `944 relates to and describes a photoelectric device comprising a clear protective envelope which encapsulates a plurality of flat photovoltaic elements, and supports the elements with intermediary mounting elements.

The Examiner explains that "plural photovoltaic elements (Figure 2:10) lie indirectly on the envelope, supported directly by intermediary mounting elements (Figure 2:18)." However, it is respectfully submitted that the photovoltaic elements identified by the Examiner are not "formed on the inside surface of the envelope and define a space within the photovoltaic element" as required by claim 102, but rather are suspended, flat as boards, in the middle of the envelope. Additionally, there is no teaching, suggestion or disclosure in Mlavsky `944 that the envelope has a radius of less than 50 mm, as required by claim 132. The Examiner concedes that Mlavsky `944 is deficient in that it does not teach that the photovoltaic elements 10 are made from layers of film, and thus relies on Middleton et al. `050 to teach such element and overcome the deficiencies of Mlavsky `944.

Middleton et al. `050 relates to and describes photovoltaic cells being flexible in nature. Notably, Middleton et al. `050 does not discuss these cells being formed on the interior surface of an envelope defining a void, nor does Middleton et al. `050 describe an envelope having a curved profile with a radius of less than 50 mm, as required by claim 132. It just describes photovoltaic cells being a film. In view of this, it is respectfully submitted that Middleton et al. `050 fails to add anything to address the above discussed deficiencies of Mlavsky `944.

Accordingly, it is respectfully submitted that the raised rejection, in view of the applied combination of Mlavsky `944 and Middleton et al. `050, should be withdrawn at this time and the rejected claims 102, 103, 106 and 107 allowed.

The Examiner further states that claims 102, 103, 126 and 130 are unpatentable over Bender `040 in view of Escoffery `862. Bender `040 relates to and describes a bicycle helmet device with photovoltaic cells attached on the outside surface of a helmet, which could then be covered with a protective plastic cover. "A plurality of solar cells 18 are secured to the outer surface of the upper substantially hemispherical shape of the helmet..." See column 2, lines 5-7. According to Bender `040's own description, however, the plurality of layers of film of the photovoltaic elements identified by the Examiner are not "formed on the inside surface of the envelope and define a space within the photovoltaic element," as required by claims 102 and 132. First, as Bender `040 states, the cells are formed on "the outer surface of the ...helmet." Second, any void in Bender `040 is defined by the interior of the helmet, *not the photovoltaic elements*. It is respectfully submitted that the photovoltaic elements of Bender `040, rather than defining a void, define the exterior of a bicycle helmet.

Further, the envelope in Bender `040 is sized generally larger than a normal human head, so that a human head can be accommodated inside during use of the bicycle helmet. Obviously then, Bender `040 fails to teach the curved profile of the envelope being sized less than 50 mm, as required by claim 132, and thus implicitly teaches against such a limitation. The Examiner concedes that Bender `040 is deficient in that it does not teach that the photovoltaic elements 10 are made from layers of film, and thus relies on Escoffery `862 to allegedly teach such element.

Escoffery `862 relates to and describes a solar battery mounting device. It is respectfully submitted that Escoffery `862 includes no reference or teaching of envelopes having a curved profile with a radius of less than 50 mm, as required by claim 132, or of photovoltaic elements being formed on the interior surface of a curved envelope defining the space. The Examiner merely uses Escoffery `862 to show that solar cells can be made from multiple layers of silicon. In view of this, it is respectfully submitted that Escoffery `862 fails to add anything addressing the above discussed deficiencies of Bender `040. Accordingly, it is

respectfully submitted that the raised rejection, in view of the applied combination of Bender `040 and Escoffery `862, should be withdrawn at this time and claims 102, 103, 126 and 130 allowed.

Next, the Examiner states that claims 102, 103, 105, 106, 110 and 130 are unpatentable over Simburger `621 in view of Ellion `588. Simburger `621 relates to and describes photoelectric device comprised of a plurality of individual solar cells mounted on curved surface designed to power satellites. See Abstract ("A power sphere has a curved surface upon which are mounted individual indivisible solar cells"). Simburger `621 indicates that these cells must "conform[] to the exterior curved surface" of the device, see column 3, line 27-28 (emphasis added), so it is obvious that the cells are formed on *the exterior surface of the device, not the inside or inner surface as with the presently claimed invention*. Therefore, it is respectfully submitted that Simburger `621 does not teach the cells where "the plurality of layers of film are formed on the inside surface of the envelope and define a space within the photovoltaic element," as required by claims 102 and 132.

Additionally, Simburger `621 describes the smallest conceived version of its device as having a diameter of 57 cm, see column 6, lines 38-40, multiple times in excess of the upper limit of the presently claimed invention. So, not only does Simburger `621 fail to teach the curved profile being sized less than 50 mm in radius, as required by claim 132, this reference specifically teaches the radius as being at least five times larger. The Examiner concedes that Simburger `621 is deficient in that it does not teach an envelope, on whose interior surface the photovoltaic elements are formed on, and thus relies on Ellion `588 to allegedly teach such element.

Ellion `588 relates to and describes a solar cell array utilizing variations in thermal heating and cooling to maximize voltage produced by the array. Ellion `588 does mention that the solar cells in a space environment have a cover of transparent glass, but it does not teach forming the cells on the inside surface of such cover. Indeed, Ellion `588 does not even state that the cover's surface comes into contact with the solar cells; and the Applicant is at a loss as to how cells may be "formed on the interior surface" of a cover that the cells may not even come into contact with. Additionally, Ellion `588 makes no mention of curved profiles being

sized less than 50 mm, as is required by claim 132. In view of the this, it is respectfully submitted that Ellion `588 fails to add anything to address the above discussed deficiencies of Simburger `621. Accordingly, it is respectfully submitted that the raised rejection, in view of the applied combination of Simburger `621 and Ellion `588, should be withdrawn at this time and rejected claims 102, 103, 105, 106, 110 and 130 allowed.

The Applicant acknowledges that the additional references of Simburger `966, Knoblach et al. `361, Nazri `743, Skov `223, Etkin `183, and Ikeda et al. `481 may arguably relate to the feature(s) indicated by the Examiner in the official action. Nevertheless, the Applicant respectfully submits that the combination of the various base references of Nakata `768, Mlavsky `944, Bender `040 and/or Simburger `621 with this additional art of Simburger `966, Knoblach et al. `361, Nazri `743, Skov `223, Etkin `183, and/or Ikeda et al. `481 still fails to in any way teach, suggest, disclose or remotely hint at the above distinguishing features of the presently claimed invention. As such, it is respectfully submitted that all of the raised rejections should be withdrawn at this time in view of the above amendments and remarks.

If any further amendment to this application is believed necessary to advance prosecution and place this case in allowable form, the Examiner is courteously solicited to contact the undersigned representative of the Applicant to discuss the same.

In view of the above amendments and remarks, it is respectfully submitted that all of the raised rejection(s) should be withdrawn at this time. If the Examiner disagrees with the Applicant's view concerning the withdrawal of the outstanding rejection(s) or applicability of the Nakata `768, Sugawara `041, Mlavsky `944, Middleton `050, Bender `040, Escoffery `862, Simburger `621, Ellion `588 Simburger `966, Knoblach et al. `361, Nazri `743, Skov `223, Etkin `183, and/or Ikeda et al. `481 references, the Applicant respectfully requests the Examiner to indicate the specific passage or passages, or the drawing or drawings, which contain the necessary teaching, suggestion and/or disclosure required by case law. As such teaching, suggestion and/or disclosure is not present in the applied references, the raised rejection should be withdrawn at this time. Alternatively, if the Examiner is relying on his/her expertise in this field, the Applicant respectfully requests the Examiner to enter an affidavit substantiating

the Examiner's position so that suitable contradictory evidence can be entered in this case by the Applicant.

In view of the foregoing, it is respectfully submitted that the raised rejection(s) should be withdrawn and this application is now placed in a condition for allowance. Action to that end, in the form of an early Notice of Allowance, is courteously solicited by the Applicant at this time.

The Applicant respectfully requests that any outstanding objection(s) or requirement(s), as to the form of this application, be held in abeyance until allowable subject matter is indicated for this case.

In the event that there are any fee deficiencies or additional fees are payable, please charge the same or credit any overpayment to our Deposit Account (Account No. 04-0213).

Respectfully submitted,

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